

International renewable energy projects

The International Renewable Energy Design Assistance Center emphasizes the cross-technology aspects of Sandia's international efforts. It promotes increased use of renewable energy in the international market and facilitates access by U.S. industry. The center offers technical assistance, identification and codevelopment of projects and their subsequent monitoring and evaluation; and education and training of users and decision makers. Expertise is drawn from across Sandia, supplemented by contractors and industry. The center works as a partner with industry in developing and conditioning sustainable international renewable energy markets.

Other Sandia capabilities

Besides expertise and facilities in specific renewable energy technologies, Sandia offers extensive testing and services in related areas. Available facilities include (to name a few) materials testing laboratories, nondestructive testing laboratories, environmental chambers, and instrumentation calibration laboratories. Users of Sandia's renewable energy services can benefit from the Labs' varied capabilities, which are drawn on as needed to augment the work of renewable energy specialists.



In the Photovoltaic Device Measurement Laboratory (left), Lloyd Irwin of Sandia's Photovoltaic Technology Evaluation Department inspects a test setup prior to testing. Above: closer view of photovoltaic cells undergoing testing.

At the Photovoltaic Systems Evaluation Laboratory (below), Jack Cannon of Sandia's Photovoltaic Design Assistance Center checks an array of photovoltaic modules.

Access to Sandia's renewable energy services

Sandia is working to accelerate the commercial use of U.S.-developed and -produced renewable energy technology, especially through partnerships with commercial firms, consortiums, state and federal agencies, and universities. Inquiries about Sandia's services should go to one of the phone numbers listed below:

Paul Klimas, Renewable Energy Office team leader,
(505) 844-8159, fax 844-7786;
Marjorie Tatro, photovoltaics,
(505) 844-3154, fax 844-6541;
Chris Cameron, solar thermal, biomass,
(505) 845-3140, fax 845-3366;
Henry Dodd, wind,
(505) 844-5253, fax 845-9500;
Jim Dunn, geothermal,
(505) 844-4715, fax 844-3952;
Don Hardesty, biomass,
(510) 294-2321, fax 294-1004;
Max Harcourt, international,
(505) 845-9941, fax 844-6541.



A single gateway to many services: Sandia's Renewable Energy Office

We need to make this bike trail safer in the evenings — can we use battery-powered lights recharged by photovoltaic cells?

Developers or potential users of renewable energy systems often start with a question.

Would a dish-Stirling system be a good choice for generating power to refrigerate medicines and perishable foods at this remote village?

The question might hinge on whether natural resources in an area are suited to renewable energy technologies or how well a technical innovation — solar oven or photovoltaic module or new type of wind turbine — stacks up against previous technology.

Given the wind speeds in this location, will a wind turbine generate enough electricity?

The questioner might be a researcher or product developer investigating which technology is best for a particular need, or whether renewable energy makes sense for a proposed application.

When a manufacturer, utility, industry group, university researcher, or government organization is exploring renewable energy — as user or developer — it often needs a single source of information, technical expertise, and test capabilities. Even established organizations with solid experience may find they are venturing into unfamiliar areas. Sandia offers a wide spectrum of information and capabilities; Sandia's Renewable Energy Office is the gateway.

Established last fall, the office connects users with a cross-technology team of engineers who work in photovoltaic, solar



The National Solar Thermal Test Facility (left) provides for tests of hardware ranging from components to large systems.

Photovoltaic-powered lights (background) illuminate a neighborhood walking-bike trail.



thermal, wind, geothermal, and biomass systems. The office is an outgrowth of Sandia's experience in helping develop and deploy renewable energy technologies. It puts developers and users of renewable energy systems in touch with capabilities and facilities that Sandia has built up through DOE sponsorship since the early 1970s. A large part of the Renewable Energy Office's work is through industrial partnerships: joint ventures, cooperative R&D agreements, cost-shared contracts, work-for-others arrangements, and design assistance activities.

Reaching out to industry

Sandia's long experience and extensive facilities are particularly valuable to manufacturers of renewable energy products. Sandia engineers participate in activities from basic R&D to deployment of full-scale systems. As representatives of a national lab, they have no vested interest in any one type of product or design approach. Thus they are ideally situated to help industry move technology from the prototype stage to commercial manufacturing. In doing so, Sandia's goal is to help build a U.S. base of renewable energy that is environmentally sound and contributes to the nation's competitiveness.

Some services that the Renewable Energy Office provides come from design assistance centers that Sandia has operated for years. Other help can come from Sandia capabilities outside renewable energy specialties. "Even if a potential user of Sandia's services and facilities doesn't know what is available or exactly what kind of assistance is needed," says Sandia's Applied Energy Program Manager Dan Arvizu, "the Renewable Energy Office can be the link to a successful interaction."

Design assistance centers

In each of the renewable technologies, Sandia's design assistance centers provide technical information and assistance. They help users and manufacturers identify and evaluate systems for proposed applications; assist during the design and installation of systems; and can provide limited cost-sharing for pilot projects demonstrating a renewable energy technology in appropriate, sustainable applications. Computerized equipment can monitor, document, and evaluate the performance of a system. Besides offering assistance to the private sector, the centers serve as a technical resource for state and federal agencies and for the military in developing energy and energy-related programs.

Among the Sandia capabilities and activities often used by commercial and governmental programs are the following:

Solar thermal energy

In solar thermal energy, Sandia teams with several industrial partners to develop more cost-effective solar technology for electric and thermal applications. Sandia operates the National Solar Thermal Test Facility for solar thermal components and systems. Tests requiring intense heat on non-solar components can also be performed. Examples of



Dish-Stirling technology (above left) being developed by Sandia and industry partners is becoming more efficient, durable, and reliable — qualities that are making it more competitive in the marketplace.



Geothermal drilling (above right) in California helps refine drilling methods and explores the potential of U.S. geothermal energy resources.



Vertical-axis wind turbine (below right) in Bushland, Texas, a testbed designed and built by Sandia, recently completed three years of tests that verified researchers' performance predictions and pointed the way to greater efficiency and lower costs for wind energy.

test subjects include concentrating mirrors and troughs, heat engines, heat-transfer media, and solar-powered refrigerators and ovens.

Photovoltaic energy

Work at Sandia in photovoltaic energy includes research, development, and testing of photovoltaic cells, modules, and entire systems. Sandia operates several facilities for testing photovoltaics: the Photovoltaic Device Fabrication Laboratory, the Photovoltaic Systems Evaluation Laboratory, and the Photovoltaic Device Measurement Laboratory.

Wind energy

The wind systems project is the world's leader in vertical-axis wind turbine technology and has extensive capabilities in horizontal-axis machines as well. Its work in fatigue, materials, reliability, controls, and field testing applies to all types of wind turbines. Analytical and experimental capabilities are available for application to a variety of wind-energy projects. Test capabilities range from laser scanners that characterize airfoil soiling to testing of full-scale turbines. Services include analysis of aerodynamic performance, structural response, fatigue life, and component reliability analysis of existing or proposed turbines.

Geothermal energy

Geothermal systems work at Sandia focuses on drilling technology and provides information about all aspects of drilling in geothermal applications, including high-temperature borehole logging. Sandia advocates slim-hole drilling for geothermal exploration and reservoir assessment and coordinates a multilaboratory effort in this area. Members of the geothermal project work with other institutions to accumulate data on geothermal heat pumps and ground loop heat exchangers. For geothermal testing, Sandia has laboratory facilities and a test range to evaluate drilling and borehole instrumentation hardware. Developmental testing and evaluation of commercial products is also part of this project. A fleet of vehicles supports full-scale testing, usually in conjunction with industry wells.

Biomass energy

The biomass project, which uses facilities at Sandia's New Mexico and California laboratories, develops direct-combustion biomass electric systems for remote applications and refines direct-combustion technology for utility-scale use. Fundamental research on the burning of fuels produced from biomass materials is performed at Sandia's Combustion Research Facility, along with research on direct combustion of biomass to produce power. Sandia is providing design assistance for biomass power plants producing up to 2 megawatts.